

## CLAIMS

- 1 1. A test system including a generator for generating an agile frequency test signal for testing a  
2 test radio where the test radio has specifications for operating in a communications system  
3 comprising,  
4 a signal component source for providing signal components including test parameters  
5 and including a test sequence and test symbols derived from radio transmissions  
6 of the communications system,  
7 a signal generator for digitally processing the test sequence, the test symbols and test  
8 parameters to form an agile test signal,  
9 a transmitter for transmitting the test signal to the test radio.
- 1 2. The system of Claim 1 wherein the test system extracts the signal components from the  
2 transmission of a transmitting radio for the communications system.
- 1 3. The system of Claim 2 wherein the transmitting radio is the test radio.
- 1 4. The system of Claim 2 wherein the transmitting radio is different from the test radio and  
2 wherein the test radio has the same specifications as the test radio.
- 1 5. The system of Claim 1 wherein the component source includes a memory for storing digital  
2 values of the signal components.
- 1 6. The system of Claim 1 wherein the test sequence is a hopping sequence and the test radio is a  
2 frequency hopping radio.
- 1 7. The system of Claim 6 wherein signal hop frequencies and message symbols are extracted  
2 from the transmission of a transmitting radio for the communications system.

- 1 8. The system of Claim 1 where the test signal is generated as an analog signal with a digital to  
2 analog converter.
- 1 9. The system of Claim 8 where the analog signal is up-converted to a higher frequency for  
2 transmission to the test radio.
- 1 10. The system of Claim 1 where the test radio is monitored to determine performance in  
2 response to the agile test signal.
- 1 11. The system of Claim 1 where the test signal is transmitted by a transmit antenna to a receive  
2 antenna of the test radio.
- 1 12. The system of Claim 1 where the test signal is transmitted by a transmit wired connection to  
2 a receive wired connection of the test radio.
- 1 13. The system of Claim 1 where interference signals are added to the test signal.
- 1 14. The system of Claim 1 where noise is added to the test signal.
- 1 15. The system of Claim 1 where a signal amplitude of the test signal is faded.
- 1 16. The system of Claim 1 wherein said test radio is a frequency hop radio and said test signal is  
2 generated with a set of specified signal parameter values, a sequence of hop frequencies and  
3 message symbols that produce a known output from the test radio when the test radio is  
4 operating properly.
- 1 17. The system of Claim 16 wherein the component source extracts the signal components from  
2 the transmission of a transmitting radio for the communications system.

- 1 18. The system of Claim 16 wherein the transmitting radio is the test radio.
- 1 19. The system of Claim 16 wherein the transmitting radio is different from the test radio and  
2 wherein the test radio has the same specifications as the test radio.
- 1 20. The system of Claim 16 wherein the component source includes a memory for storing digital  
2 values for the signal components.
- 1 21. The system of Claim 16 wherein the test sequence is a hopping sequence and the test radio is  
2 a frequency hopping radio.
- 1 22. The system of Claim 16 where signal hop frequencies and message symbols are extracted  
2 from the transmission of a transmitting radio for the communications system.
- 1 23. The system of Claim 16 where the test signal is generated as an analog signal with a digital to  
2 analog converter.
- 1 24. The system of Claim 23 where the analog signal is up-converted to a higher frequency for  
2 transmission to the test radio.
- 1 25. The system of Claim 16 where the test radio is monitored to determine performance in  
2 response to the agile test signal.
- 1 26. The system of Claim 16 where the test signal is transmitted by a transmit antenna to a receive  
2 antenna of the test radio.
- 1 27. The system of Claim 16 where the test signal is transmitted by a transmit wired connection to  
2 a receive wired connection of the test radio.

1 28. The system of Claim 16 where interference signals are added to the test signal.

1 29. The system of Claim 16 where noise is added to the test signal.

1 30. The system of Claim 16 where a signal amplitude of the test signal is faded.

1 31. A test system including a generator for generating an agile frequency test signal for testing a  
2 test radio where the test radio has specifications for operating in a communications system  
3 comprising,

4 a receiver for receiving a frequency hopping radio input signal transmitted in the  
5 communications system, said input signal having segments at different  
6 hopping frequencies and different hopping times,

7 a broadband processor for processing said input signal to determine signal  
8 components, and for each segment,

9 determining from the input signal a hopping time of the segment,

10 determining from the input signal a frequency of the segment, and

11 determining signal parameters,

12 a signal component memory for storing said signal components including a test  
13 sequence, test symbols and test parameters,

14 a signal generator for digitally processing the test sequence, the test symbols and test  
15 parameters to form an agile test signal,

16 a transmitter for transmitting the test signal to the test radio.

1 32. The system of Claim 31 where said processor extracts message symbols from said input  
2 signal.

1 33. The system of Claim 32 where the message symbols are extracted from each hop.

1 34. The system of Claim 31 where said processor extracts a carrier frequency from each hop

- 1 35. The system of Claim 31 where the test signal from said signal generator is processed with a  
2 digital to analog converter to form an analog test signal.
- 1 36. The system of Claim 35 where the analog signal is up converted to a higher frequency for  
2 transmission to the test radio.
- 1 37. The system of Claim 31 where the test radio is monitored to determine performance in  
2 response to the test signal.
- 1 38. The system of Claim 37 where the test radio performance is determined by an operator  
2 manually.
- 1 39. The system of Claim 37 where the test radio performance is determined with an automated  
2 system.
- 1 40. The system of Claim 31 where interference signals are added to the test signal.
- 1 41. The system of Claim 31 where noise is added to the test signal.
- 1 42. The system of Claim 31 where a signal amplitude of the test signal is faded.